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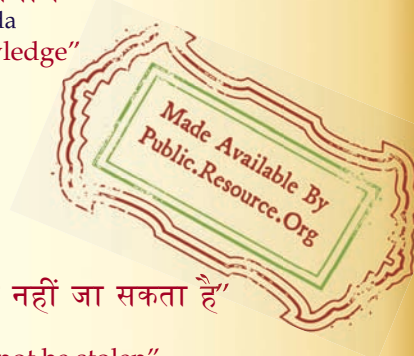
IS 9139 (1979): Malleable iron shots and grits for use in foundries [MTD 14: Foundry]



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“Knowledge is such a treasure which cannot be stolen”

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IS : 9139 - 1979

Indian Standard
SPECIFICATION FOR
MALLEABLE IRON SHOTS AND GRITS
FOR USE IN FOUNDRIES

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MANAK BHAVAN, 9, BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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AMENDMENT NO. 1 FEBRUARY 1983
TO

IS:9139-1979 SPECIFICATION FOR MALLEABLE IRON SHOTS
AND GRITS FOR USE IN FOUNDRIES

Alteration

(Page 7, clauses 12 and 12.1) - Delete and re-
number the subsequent clauses accordingly.

(SMDC 17)

Reprography Unit, ISI, New Delhi, India

Indian Standard

SPECIFICATION FOR MALLEABLE IRON SHOTS AND GRITS FOR USE IN FOUNDRIES

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IS : 9139 - 1979

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(Continued on page 11)

Indian Standard
**SPECIFICATION FOR
MALLEABLE IRON SHOTS AND GRITS
FOR USE IN FOUNDRIES**

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 16 April 1979, after the draft finalized by the Foundry Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This Indian Standard is one in the series of specifications for abrasives for use in foundries in shot blasting machines for cleaning of castings. Other standards are IS : 4606-1968*, IS : 4683-1968† and IS : 5873-1970‡. Malleable iron abrasives give a less severe abrasive action but a longer life as compared to chilled iron shot and grit. These are cheaper than steel shots having a little less abrasive action and life.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960§. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for malleable iron shot and grit for use in foundries as shot blasting machine abrasive.

2. DESIGNATION AND GRADING

2.1 Malleable iron shot shall be designated as S-M and graded by the shot number which is the aperture size of the retaining screen in thousandths of a millimetre (*see* Table 1).

2.2 Malleable iron grit shall be designated as G-M graded by the grit number which is the aperture size of the retaining screen in hundredths of a millimetre (*see* Table 2).

*Specification for steel shot for use in foundries

†Specification for chilled iron shot and grit for use in foundries.

‡Specification for steel cut-wire shots for use in foundries.

§Rules for rounding off numerical values (*revised*).

TABLE 1 SHOT GRADE NUMBERS

Cluses 2.1 and 6.1

IS SIEVE DESIGNATION	WGT-OF APERTURE mm	SHOT NUMBER										
		S-M3350	S-M2800	S-M2350	S-M2000	S-M1700	S-M1400	S-M1180	S-M1000	S-M850	S-M600	S-M300
4.75-mm	4.75											
4.00-mm	4.00											
3.35-mm	3.35	90										
2.80-mm	2.80		90									
2.36-mm	2.36			90								
2.00-mm	2.00				85							
1.70-mm	1.70					85						
1.40-mm	1.40						85					
1.18-mm	1.18							80				
1.00-mm	1.00								80			
850-micron	0.850									80		
710-micron	0.710										10% Max ON	
600-micron	0.600											10% Max ON
500-micron	0.500											
425-micron	0.425										75	15
355-micron	0.355											10% Max ON
300-micron	0.300											
180-micron	0.180											
90-micron	0.090											

Note—When IS sieves are not available, equivalent BS or ASTM sieves specified in Appendix A may be used.

TABLE 2 GRIT GRADE NUMBERS

(Clause 2 and 6.)

IS SIEVE DESIGNATION	W. L. OF APERTURE mm	GRT NUMBER											
		G-M235	G-M200	G-M170	G-M140	G-M118	G-M100	G-M85	G-M50	G-M42	G-M30	G-M18	G-M05
3.35 mm	3.35												
2.80 mm	2.80												
2.50 mm	2.50	80	10						All pass				
2.00 mm	2.00		80	10									
1.75 mm	1.75			80	10								
1.40 mm	1.40				80	10							
1.18 mm	1.18					75	10						
1.00 mm	1.00						75	15					
850 micron	0.850							75	15				
710 micron	0.710								70	15			
600 micron	0.600												
500-micron	0.500	None pass, except 2 percent, max allowed or fines											
425-micron	0.425									70	15		
355-micron	0.355												
300-micron	0.300												
250-micron	0.250												
180-micron	0.180											65	20
90-micron	0.090											65	20

Note: When L series are not available equivalent 65 or 75 sieves specified in order is used.

IS : 9139 - 1979

3. SUPPLY OF MATERIAL

3.1 General requirements relating to the supply of malleable iron shot and grit shall be as laid down in IS : 1387-1967*.

4. MATERIAL

4.1 The malleable iron shot and grit shall be manufactured by malleablising white iron shot and grit using a suitable heat treatment procedure.

5. SHAPE

5.1 Shot — The particles shall as far as practicable be spherical and solid and shall not contain more than 5 percent of 'tail,' and irregular particles.

5.2 Grit — The particles shall show good angularity of form with sharp cutting edges and shall be substantially free from 'half rounds' (that is, shot split into half only).

6. SIZE

6.1 The particle size shall be determined by testing with sieves complying with IS : 460-1962†. The proportions retained and passed shall comply with the limits given in Tables 1 and 2

Examples :

Shot Grade S-M 1180 — The whole sample passes through 2·00 mm IS Sieve. At most 5 percent is retained on 1·70-mm IS Sieve. At least 80 percent is retained on 1·18-mm IS Sieve. At most 15 percent passes through 1·18-mm IS Sieve and at most 1 percent through 0·85-mm IS Sieve.

Grit Grade G-M 60 — The whole sample passes through 1·00-mm IS Sieve. At least 70 percent is retained on 600-micron IS Sieve. At most 15 percent passes through 600-micron IS Sieve and at most 4 percent passes through 425-micron IS Sieve.

7. CHEMICAL COMPOSITION

7.1 The material when tested in accordance with the methods given in IS : 228-1959‡ shall have the following composition:

<i>Constituent</i>	<i>Percent</i>
Carbon	2·0-3·0
Silicon	0·8-2·0
Manganese	1·0 <i>Max</i>
Sulphur	0·2 <i>Max</i>
Phosphorus	0·2 <i>Max</i>

*General requirements for the supply of metallurgical materials (*first revision*).

†Specification for test sieves (*revised*).

‡Methods of chemical analysis of pig iron, cast iron and plain carbon low alloy steels (*revised*).

8. HARDNESS

8.1 The average hardness of the particles shall be 200 to 300 HV.

8.1.1 In obtaining average hardness values, at least 100 particles taken from the representative sample shall be mounted in plastic, ground and polished. A minimum of 20 hardness readings shall be taken at random in accordance with the method given in IS : 1501-1968* using a 5 kg load

8.1.2 None of the hardness values shall be lower than 170 HV or higher than 345 HV.

9. MICROSTRUCTURE

9.1 Malleable iron shot and grit shall have a microstructure consisting of nodules of temper carbon in a matrix predominantly pearlitic or tempered merrtensitic. The free ferrite content in the matrix shall not exceed 10 percent. Free cementite shall not exceed 10 percent and it shall be distributed as isolated particles and not a continuous network. The abrasives shall be taken as not complying with this standard if over 15 percent of particles have unsatisfactory microstructure.

10. SPECIFIC GRAVITY

10.1 Specific gravity of malleable iron shots shall not be less than 6.6 g/ml nor contain more than 10 percent hollow shots. The method for determining the specific gravity may be the displacement method or on actual count of hollow shots in a mounted polished specimen.

11. SAMPLING

11.1 Representative samples drawn and the criteria for conformity for various requirements shall be as given in Appendix B.

12. RETEST

12.1 If the sample selected fails to meet the requirements given under 6, 7, 8 and 9, two further samples shall be taken for each retest. Should the two retests satisfy the requirements of this standard the lot shall be accepted. Should either of the samples fail, the material shall be taken as not complying with the requirements of this standard.

13. PACKAGING

13.1 Unless otherwise specified the material shall be supplied in waterproof double gunny bags or polythene lined gunny bags each containing 50 kg

*Method for Vickers hardness test for steel (*first revision*)

IS : 9139 - 1979

14. MARKING

14.1 Each container shall be clearly marked with the following information:

- a) Manufacturer's name or trade-mark, and
- b) Size and type designation of the material.

14.1.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

APPENDIX A

(Note in Tables 1 and 2)

COMPARATIVE SIEVE DESIGNATIONS OF IS, BS AND ASTM SIEVES

<i>IS Sieve</i>	<i>BS Sieve</i>	<i>US Standard Sieve (ASTM Sieve)</i>
4 75 mm	—	4 76 mm (4)
4 00 mm	—	4 00 mm (5)
3 35 mm	5	3 36 mm (6)
2 80 mm	6	2 83 mm (7)
2 36 mm	7	2 38 mm (8)
2 00 mm	8	2 00 mm (10)
1 70 mm	10	1 63 mm (12)
1 40 mm	12	1 41 mm (14)
1 18 mm	14	1 19 mm (16)
1 00 mm	16	1 00 mm (18)
850 micron	18	841 μ (20)
710 micron	22	707 μ (25)
600 micron	25	595 μ (30)
500 micron	30	500 μ (35)
425 micron	36	420 μ (40)
355 micron	44	354 μ (45)
300 micron	52	297 μ (50)
180 micron	85	177 μ (80)
90 micron	170	88 μ (170)

APPENDIX B

(Clause 11.1)

SAMPLING AND CRITERIA FOR CONFORMITY**B-1. LOT**

B-1.1 In any consignment, all the containers containing material of the same quality and manufactured under similar conditions of manufacture shall be grouped together to constitute a lot.

B-1.1.1 Samples shall be taken and tested from each lot for ascertaining the conformity

B-2. SCALE OF SAMPLING

B-2.1 The number of containers, to be selected, shall be according to col (1) and (2) of Table 3.

TABLE 3 SCALE OF SAMPLING

No. of CONTAINERS TO BE IN THE LOT	No. of CONTAINERS TO BE SELECTED
<i>N</i>	<i>n</i>
(1)	(2)
Up to 100	5
101 to 300	8
301 to 500	13
501 and above	20

B-2.1.1 The containers shall be selected at random. For this purpose, the provisions given in IS : 4905-1968* shall be used.

B-3. PREPARATION OF TEST SAMPLES

B-3.1 From each of the selected containers, as in col (1) and (2) of Table 3, with the help of a suitable sampling instrument 0.5 kg material shall be taken. This material shall be taken from the top, centre and bottom of each selected containers. Samples taken from each container shall be mixed to form a composite sample of 2.5 kg. By coning and

* Methods for random sampling.

IS : 9139 - 1979

quartering division method the 2.5 kg shall be reduced to give a final test sample of 300 g. The sample, thus obtained, shall be divided into three equal portions, one for the purchaser, the second for the manufacturer and the third shall be kept as a referee sample.

B-4. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

B-4.1 The sample prepared as per **B-3.1** shall be used to test for chemical size, hardness and microstructure characteristics.

B-4.2 If the sample fails to meet any one of the relevant requirements (see **B-4.1**) two further samples taken and tested for the requirement in which the sample has failed. If the material tested conforms to the relevant requirement while retesting two samples, the lot shall be declared as conforming to the specification, otherwise not.

(Continued from page 2)

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<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

<i>Quantity</i>	<i>Unit</i>	<i>Symbol</i>	<i>Definition</i>
Force	newton	N	1 N = 1 kg. m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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